

## Special Report: Impact of El Niño on State Wheat Yields

Phin Ziebell, NAB Agribusiness Economist, July 2014

- NAB's July 2014 Rural Commodities Wrap includes an in focus section on wheat. While the Bureau of Meteorology's climate models now indicate that it is increasingly unlikely to be a strong event, a risk to wheat yields remains. This report tracks State level wheat yields from 1899-00 to 2013-14 to assess the impact of El Niño on yields.
- El Niño is characterised by a warming in sea surface temperatures in the Pacific ocean. This in turn lowers atmospheric pressure over the central Pacific compared to Australia, leading to lower strength Pacific trade winds.
- El Niño affects temperature and rainfall in North and South America, Africa, East and Southeast Asia, the Indian subcontinent, Australia and the Pacific. Locally, the phenomenon causes generally lower winter and spring rainfall in northern and eastern Australia.
- As wheat is a winter crop in Australia, sown in autumn and early winter and harvested in spring and summer, wheat yields are sensitive to winter and spring rainfalls. The presence of El Niño can cause substantial reductions in Australian wheat yields, in particular in eastern Australia.
- The impact of El Niño on wheat yields is variable and difficult to predict. While the emergence of El Niño in early spring would likely lower yields, an emergence in November or December may boost yields. In the eastern States, the impact is often severe, with yields slashed during El Niño events. Western Australia is less susceptible, although not entirely immune.

### Winter-Spring Mean Rainfall Deciles for 12 moderate-strong classical El Niños

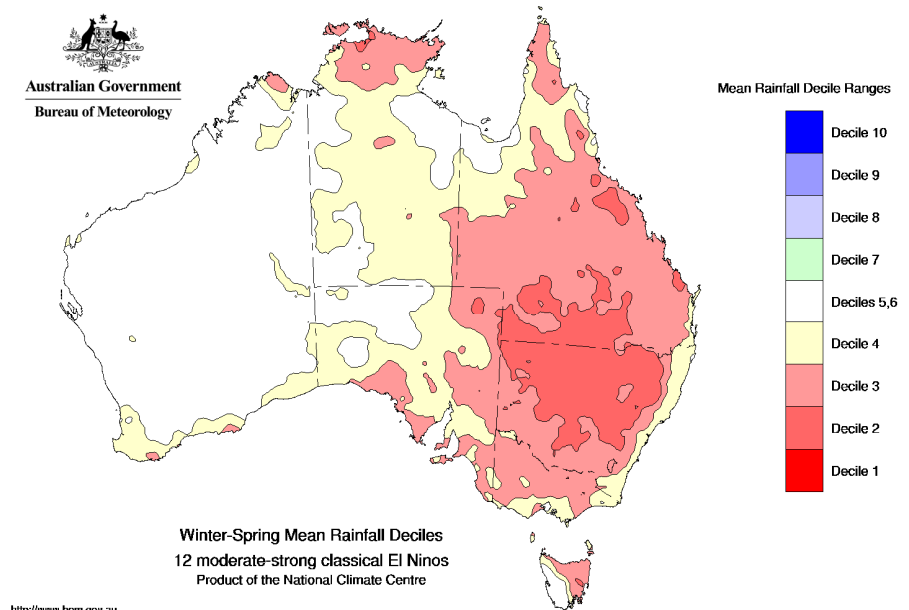


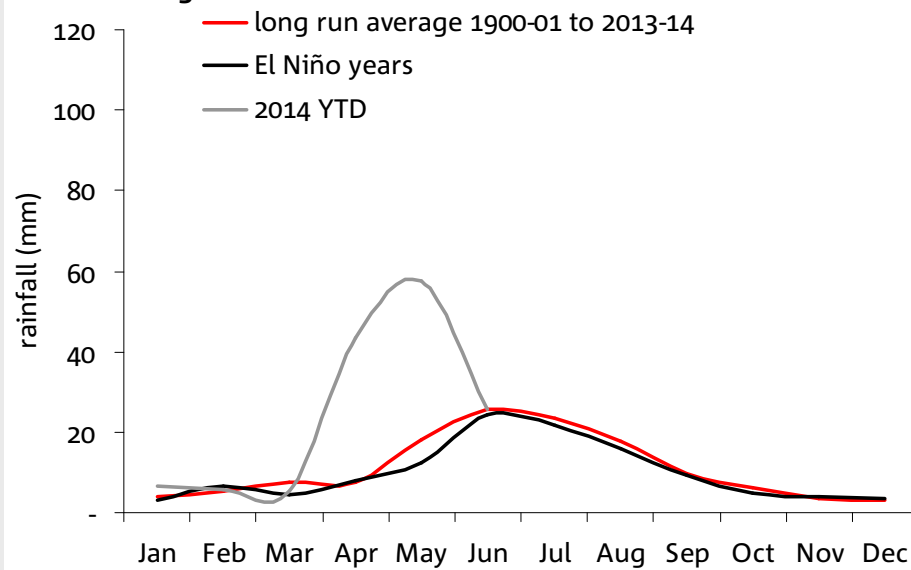
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## Western Australia

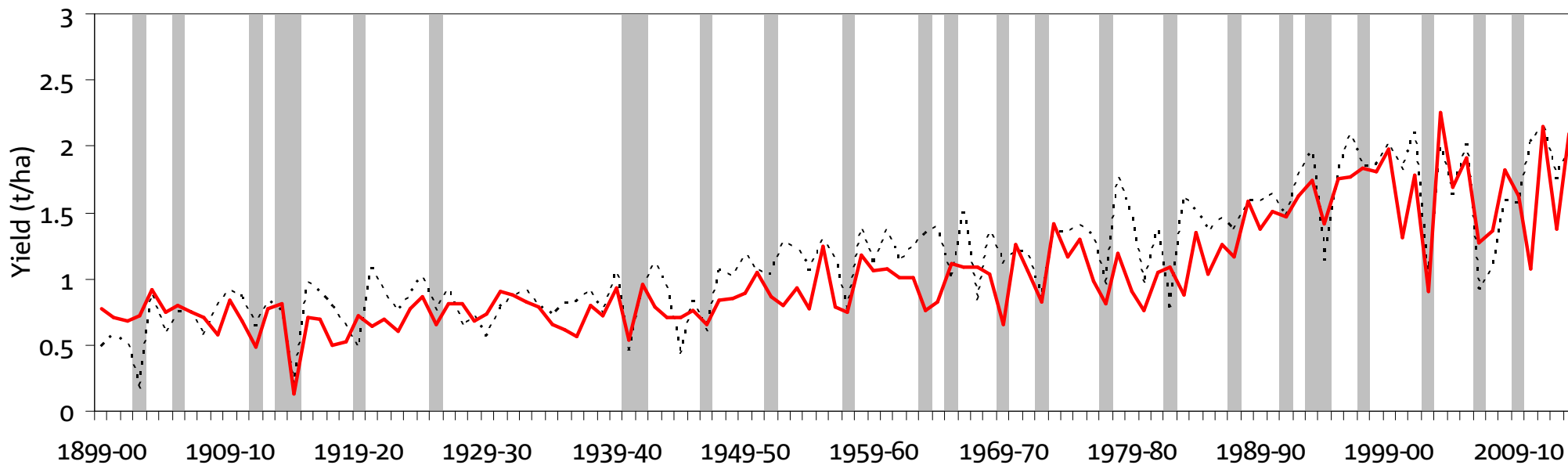
- Western Australia was Australia's largest wheat producer in 2013-14, accounting for 39% of national production – some 10,500kt, most of which is exported.
- As El Niño is largely an issue for eastern Australia, Western Australian wheat yields tend to be less volatile than those in the eastern States and the impact of El Niño is generally lower. However in some years, El Niño can reduce yields in the west. 1914-15, 2002-03 and 2006-07 stand out as El Niño years where Western Australian yields fell substantially.
- Figure 1 shows average rainfall in Western Australian wheat regions and rainfall during El Niño periods. 2014 YTD data shows a dry summer, followed by good rains in April and May and lower rainfall in June. NAB agribusiness bankers report a generally very good start to the season, although some farmers in northern areas are chasing rains.

Figure 1: average monthly rainfall – Western Australian wheat regions



Source: NAB Group Economics, Bureau of Meteorology

Figure 2: Wheat yield – Western Australia (shaded areas show El Niño events, dotted line shows national wheat yield)

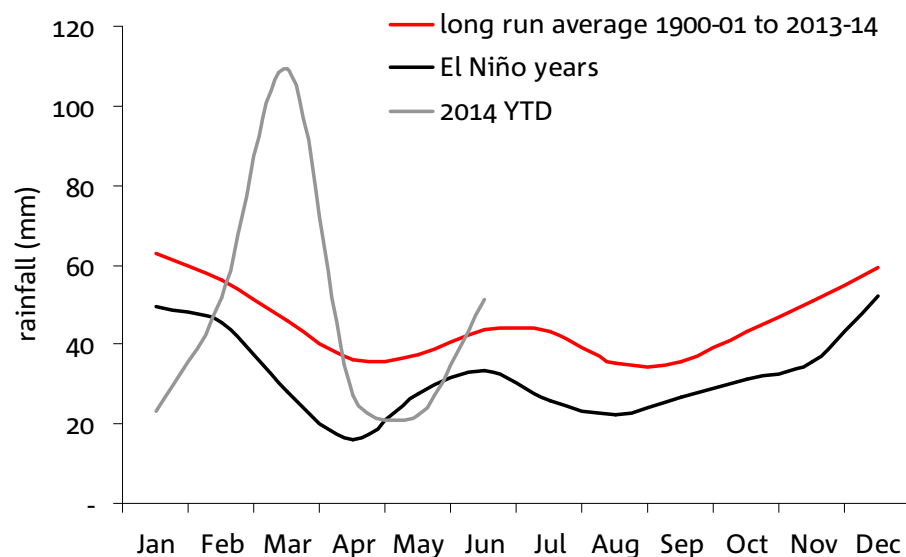


Source: Bureau of Meteorology, Australian Bureau of Statistics, ABARES

## New South Wales

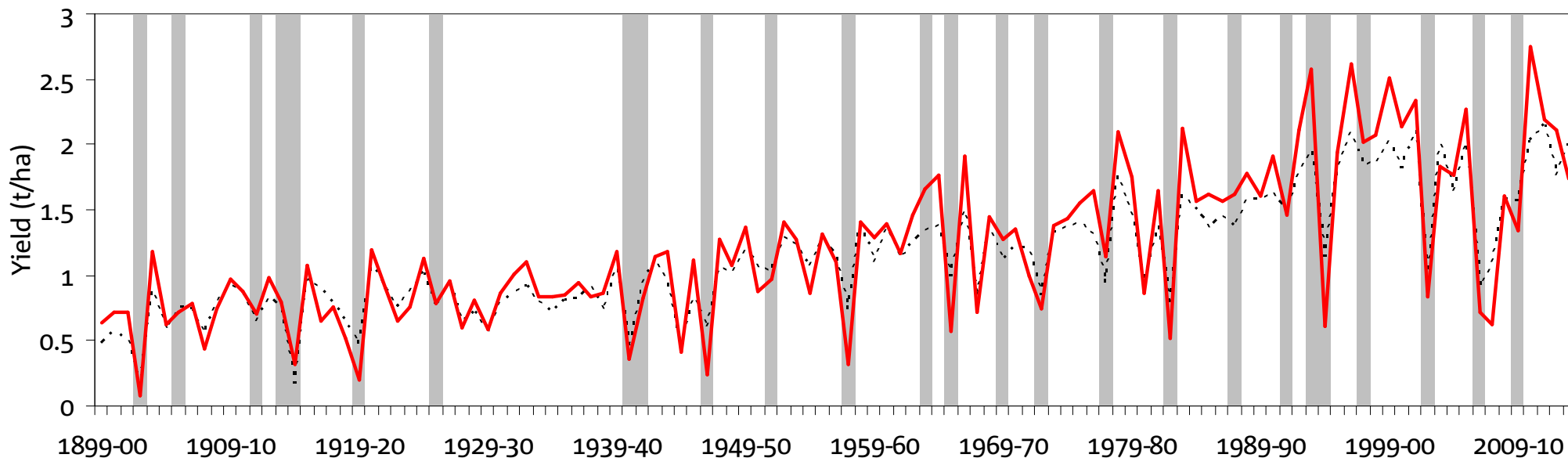
- New South Wales was Australia's second largest wheat producer in 2013-14, accounting for 24% of national production or some 6,612kt. In some years, New South Wales has been Australia's largest wheat producer.
- Wheat yield in El Niño years is generally significantly lower than in non-El Niño years and yields mostly track below the national average during these periods. However, this trend is not uniform. For example, New South Wales recorded its third highest wheat yield on record – well above the national average – in the 1993-94 El Niño year, although yields dropped 76% when El Niño persisted into 1994-95.
- Figure 3 shows average rainfall in New South Wales wheat regions and rainfall during El Niño periods. 2014 YTD data conceals substantial regional variation, with southern areas performing much better so far. BoM's latest forecasts suggest that rainfall in southern New South Wales may be below average from August to October.

Figure 3: average monthly rainfall – New South Wales wheat regions



Source: NAB Group Economics, Bureau of Meteorology

Figure 4: Wheat yield – New South Wales (shaded areas show El Niño events, dotted line shows national wheat yield)

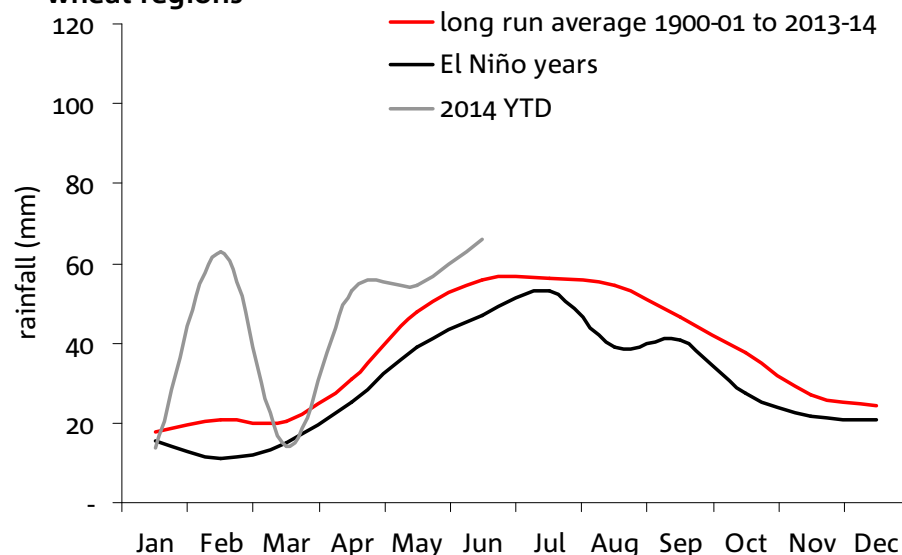


Source: Bureau of Meteorology, Australian Bureau of Statistics, ABARES

## South Australia

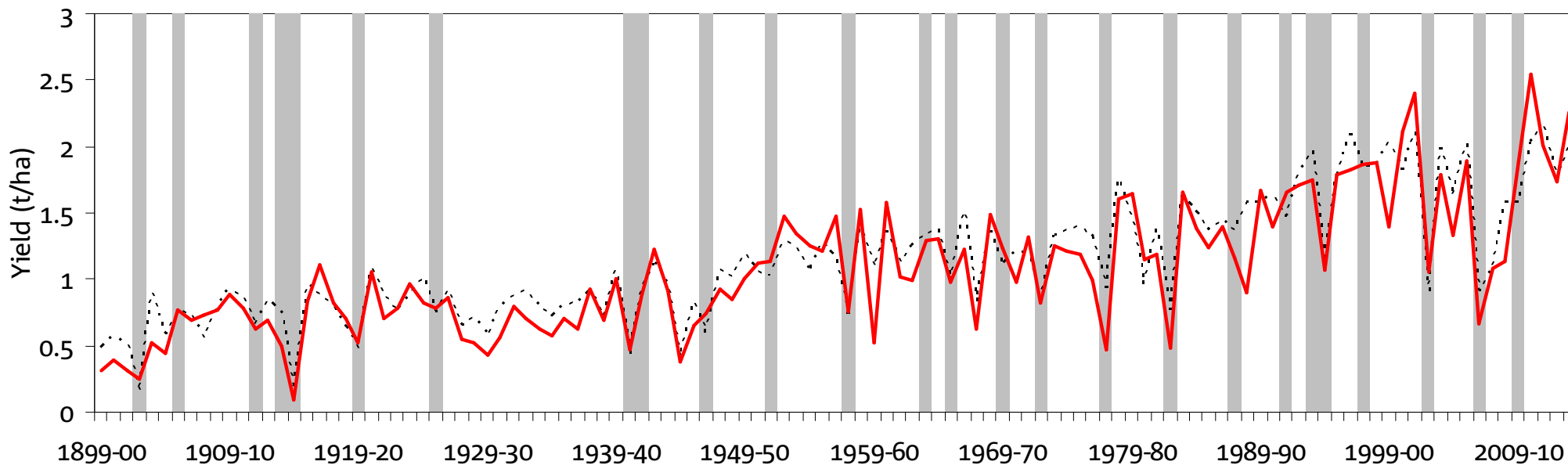
- South Australia was Australia's third largest wheat producer in 2013-14, accounting for 19% of national production or some 5,128kt.
- Like Victoria, the South Australian wheat yield is highly susceptible to El Niño. El Niño events in 1977-78, 1982-83 and 2006-07 all saw yields sink below one tonne per hectare.
- Figure 5 shows average rainfall in South Australian wheat regions and rainfall during El Niño periods. 2014 YTD data shows generally above average rainfalls, with the exception of March, and reflects reports by NAB agribusiness bankers that the season is off to a good start, with good subsoil moisture and even the problem of water-logging in a small number of cases.

Figure 5: average monthly rainfall – South Australian wheat regions



Source: NAB Group Economics, Bureau of Meteorology

Figure 6: Wheat yield – South Australia (shaded areas show El Niño events, dotted line shows national wheat yield)

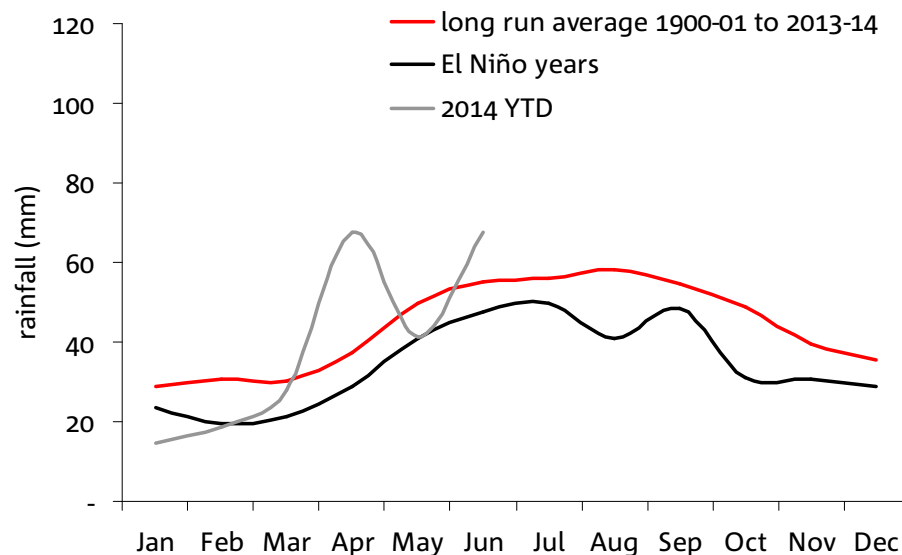


Source: Bureau of Meteorology, Australian Bureau of Statistics, ABARES

## Victoria

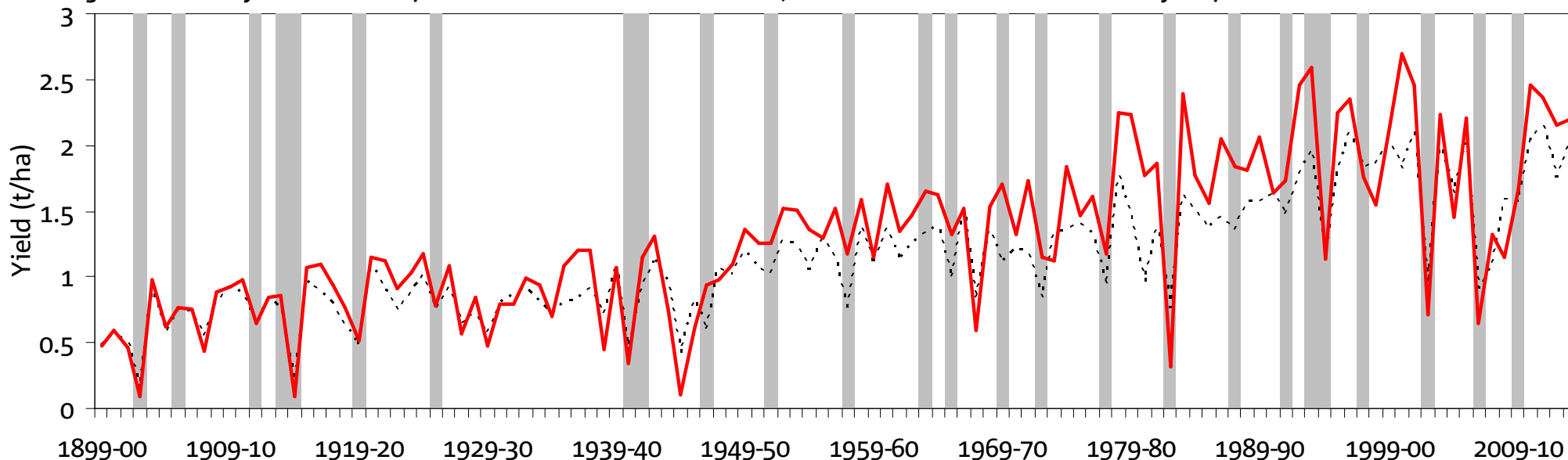
- Victoria was Australia's fourth largest wheat producer in 2013-14, accounting for 13% of national production or some 3,541kt.
- Victorian wheat yield is highly susceptible to El Niño. El Niño events in 1982-83, 2002-03 and 2006-07 all saw yields sink below one tonne per hectare. However, yields were above the national average in 1987-88 and 1993-94.
- Figure 7 shows average rainfall in Victorian wheat regions and rainfall during El Niño periods. 2014 YTD data shows Victorian regions receiving good autumn and early winter rainfall. However, the below average rainfall in January, February and March left subsoil moisture levels depleted, placing greater importance on winter rainfall. BoM's latest forecasts suggest that rainfall in most of Victoria may be below average from August to October.

Figure 7: average monthly rainfall – Victorian wheat regions



Source: NAB Group Economics, Bureau of Meteorology

Figure 8: Wheat yield – Victoria (shaded areas show El Niño events, dotted line shows national wheat yield)

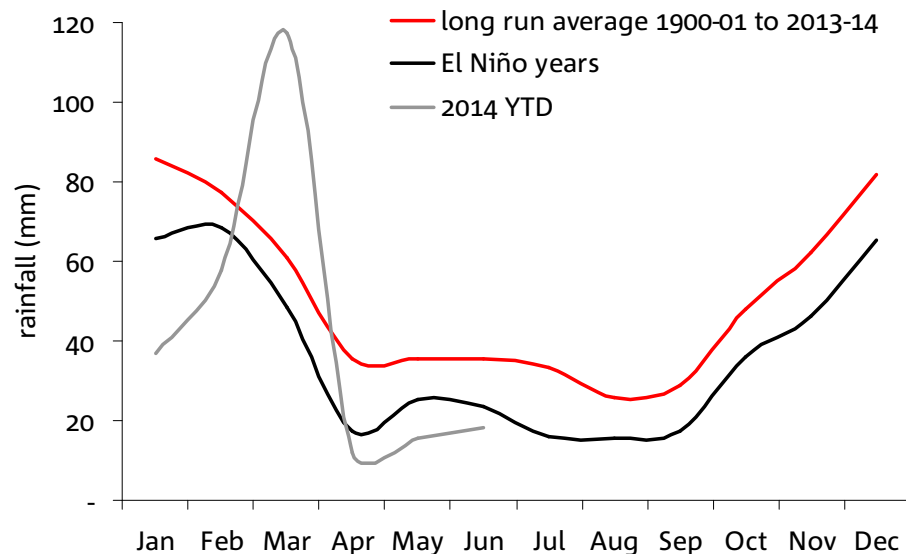


Source: Bureau of Meteorology, Australian Bureau of Statistics, ABARES

## Queensland

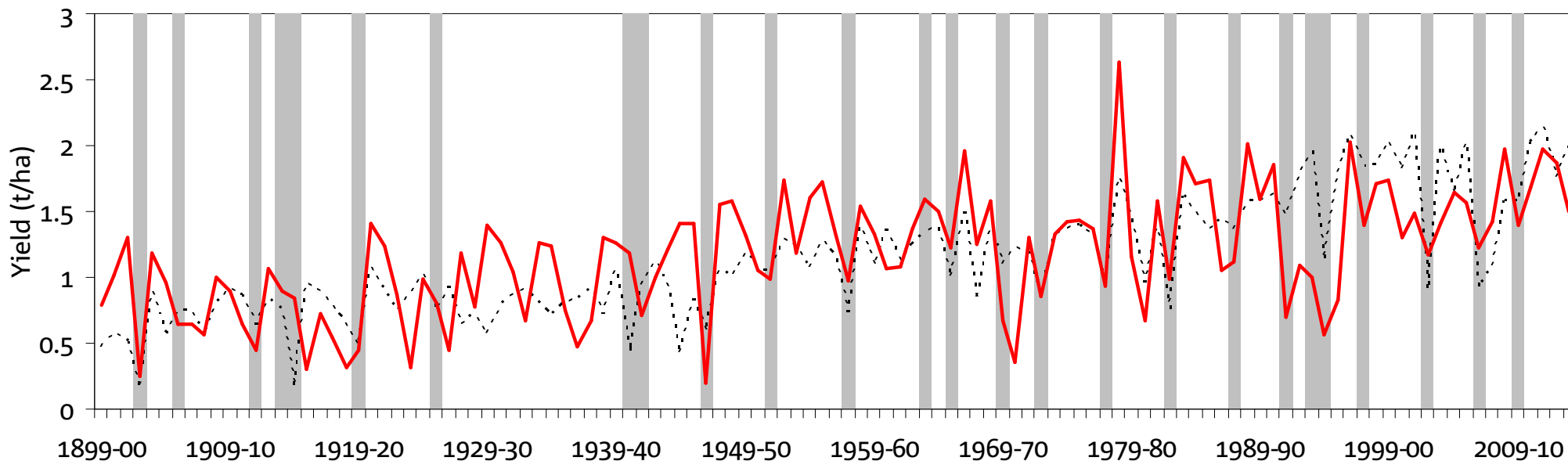
- Queensland was Australia's fifth largest wheat producer in 2013-14, accounting for 4% of national production or some 1,200kt.
- The impact of El Niño on Queensland wheat yields is quite variable. For example, the El Niño events of the early to mid 1990s took a heavy toll on yields. However Queensland yields, while affected by El Niño in 2002-03 and 2006-07, still outperformed the national average.
- Figure 9 shows average rainfall in Queensland wheat regions and rainfall during El Niño periods. 2014 YTD data shows that decent rains in March have been followed with very low falls in April, May and June – below average rainfall for those months during El Niño periods. Combined with a number of heavy frosts, this makes the Queensland 2014-15 wheat crop highly reliant on strong rains in July and August for reasonable yields. If El Niño emerges early, the Queensland wheat crop stands to be sharply lower.

Figure 9: average monthly rainfall – Queensland wheat regions



Source: NAB Group Economics, Bureau of Meteorology

Figure 10: Wheat yield – Queensland (shaded areas show El Niño events, dotted line shows national wheat yield)

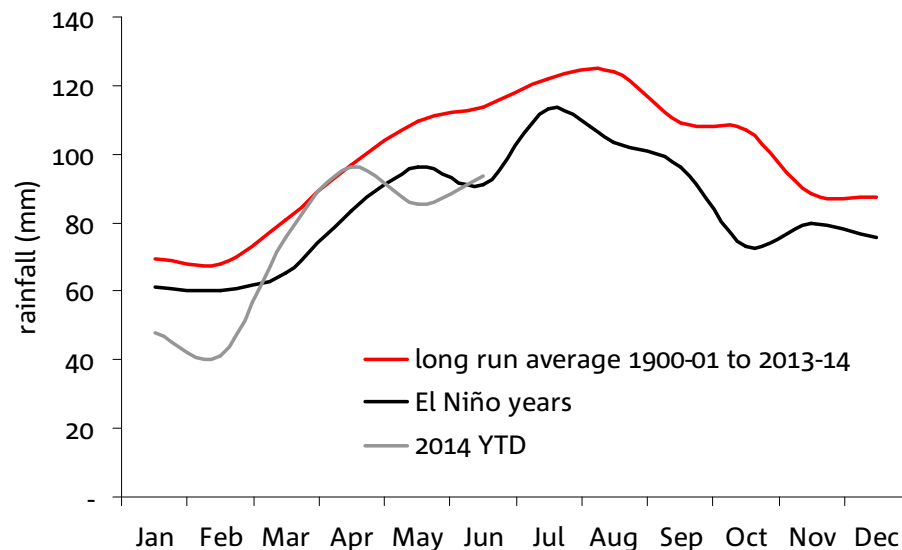


Source: Bureau of Meteorology, Australian Bureau of Statistics, ABARES

## Tasmania

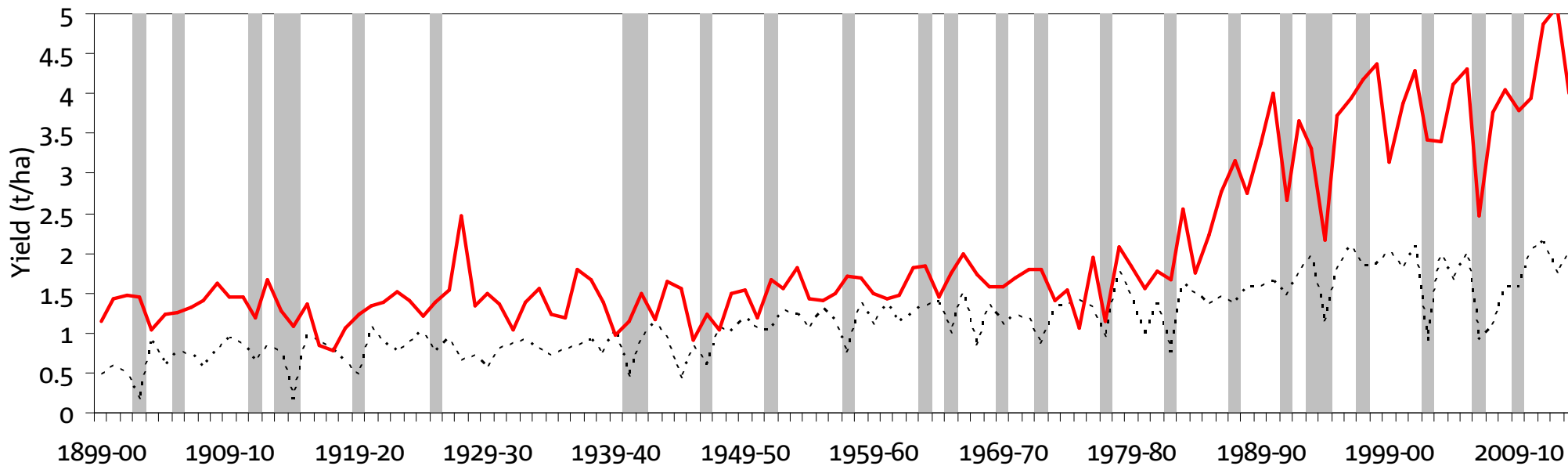
- Tasmania is a very small wheat producer. In 2013-14, Tasmania produced 32kt of wheat, only 0.1% of national production.
- Tasmania's wheat yield has grown significantly since the 1980s and is now more than twice the national average. Nonetheless, changes to Tasmanian yields have not materially influenced the national average.

Figure 11: average monthly rainfalls – Tasmanian wheat regions



Source: NAB Group Economics, Bureau of Meteorology

Figure 12: Wheat yield – Tasmania (shaded areas show El Niño events, dotted line shows national wheat yield)



Source: Bureau of Meteorology, Australian Bureau of Statistics, ABARES

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